

Library Update: Physics Information Seeking in an AI-driven World

Ian Gordon, Brock Library Teaching & Learning Librarian



An update about the library, databases, and strategies to remain current. This will involve gaining feedback on AI-assisted and other text- and physics-based open and proprietary resources.

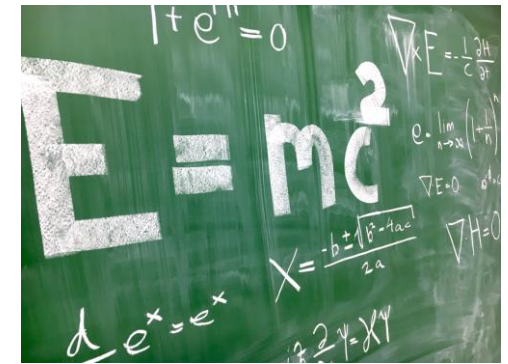


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Agenda

What's new in the library

Brock Library Physics Research Guide

Databases – lots of them

Citation management

Where, how and when to get help!

Information Seeking Behaviors, Attitudes, and Choices of Academic Physicists

Ian D. Gordon , Debbie Chaves , Dyanne Dearborn , Shawn Hendrikx ,
Rebecca Hutchinson , Christopher Popovich , and Michael White 

^aLiaison Services, Brock University, James A. Gibson Library, St. Catharines, Ontario, Canada; ^bUser Services, Wilfrid Laurier University Library, Waterloo, Ontario, Canada; ^cPhysics Library, University of Toronto, Toronto, Ontario, Canada; ^dThe D.B. Weldon Library, Western University, London, Ontario, Canada; ^eDavis Centre Library, University of Waterloo, Waterloo, Ontario, Canada; ^fMcLaughlin Library, University of Guelph, Guelph, Ontario, Canada; ^gEngineering & Science Library, Queen's University, Kingston, Ontario, Canada

ABSTRACT

Physicists in academic institutions utilize a variety of resources and strategies to seek, find, and use scholarly information and news. Using a sample of physicists, researchers surveyed 182 students and faculty at seven Canadian university institutions to explore self-perceived success rates, resources consulted, databases used, and use of social media and citation management systems. To complement the survey, 11 follow up interviews/focus groups were completed with participants to further uncover information-seeking behaviors, choices, strategies, and feelings around keeping up to date with information needs. According to survey results, a minority of physicists (15.4%) acknowledged that they were successfully keeping up to date. However, a significant number of physicists (28.6%) indicated that they were unsuccessful and could do better in remaining current with information needs. Co-investigators, using qualitative analyses, identified four emergent themes: (1) There are "too many papers – and not enough time" to effectively search, evaluate and read scholarly papers of interest; (2) Staying up to date is important especially in competitive research areas; (3) Graduate students seek information differently than faculty and experienced researchers; and (4) The arXiv database is important to many physicists. Additional minor themes included physics-related publishing is constantly evolving; physicists use a variety of information-seeking behaviors; and, information-seeking methods can differ between physics subdisciplines. This study aims to shed light on opportunities for academic librarians to identify and meet physicists' evolving information behaviors, attitudes, choices, and needs.

KEYWORDS

Physicists;
information-seeking
behaviors; information
needs; information sources;
graduate students; faculty;
academic (university)
libraries; knowledge
management; information
literacy

Introduction

How do physicists seek information? What resources do they consult? How successful are they? What information-seeking behaviors do they exhibit? How do they feel about these choices? These questions form the basis of this study as

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Gordon, I. D., Chaves, D., Dearborn, D., Hendrikx, S., Hutchinson, R., Popovich, C. & White, M. (2022). Information seeking behaviors, attitudes, and choices of academic physicists. *Science & Technology Libraries*, 41(3), 288-318. <https://doi.org/10.1080/0194262X.2021.1991546>

Success rate of physicists keeping up to date:

Note really successful, I could do better	28.6%
Somewhat successful, I use a variety of resources	56.0%
Successful, I believe I keep on top of new developments	15.4%

N=652

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Emergent themes:

1. too much information and not enough time to keep up to date
2. staying up to date is important especially in competitive research areas
3. graduate students seek information differently than faculty and experienced researchers.

The information literate person can:



Information

<https://aau.ac.ae/en/blog/ten-signs-to-know-if-you-are-information-literate>

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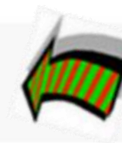
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Metadata Librarian

IAN GORDON

Teaching & Learning Librarian



Ian Gordon

Teaching & Learning Librarian (Librarian III)

Applied Health Sciences, Mathematics & Science



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[Book a Consultation](#)

Ian Gordon is a member of the Brock Library Teaching & Learning Team. Ian's interests include STEM teaching, information seeking, and providing one-on-one assistance for the Faculty of Mathematics and Science, Faculty of Applied Health Sciences, and all points in between. Book a [research consultation](#) to work through an idea, get help searching the literature, exploring an idea, or learn something new together.

Publications and collections

- Ian D. Gordon ORCID database record @ <https://orcid.org/0000-0003-1128-3301>
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Physics March 1, 2024 presentation [slides](#) (PDF).



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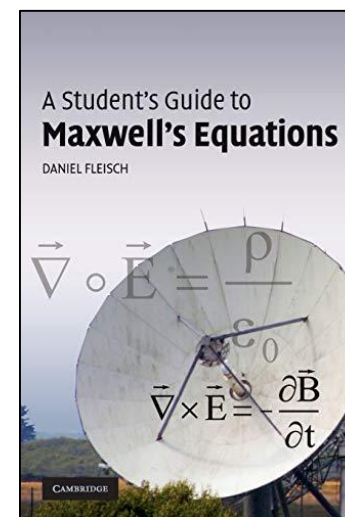
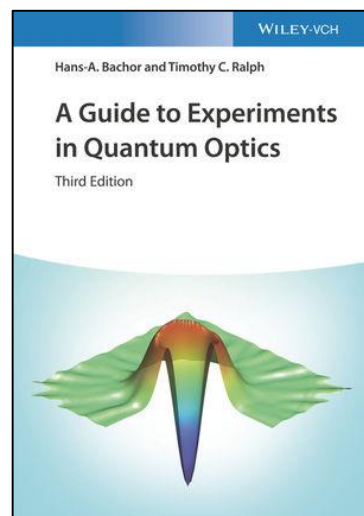
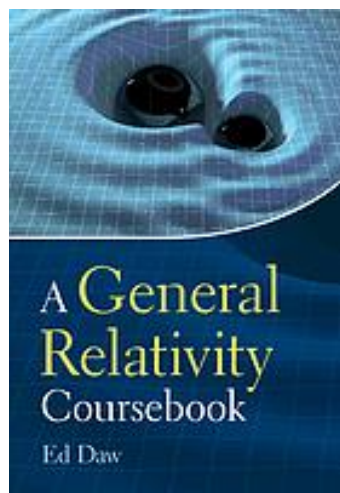
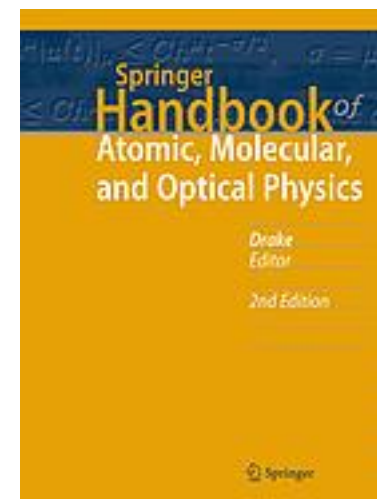
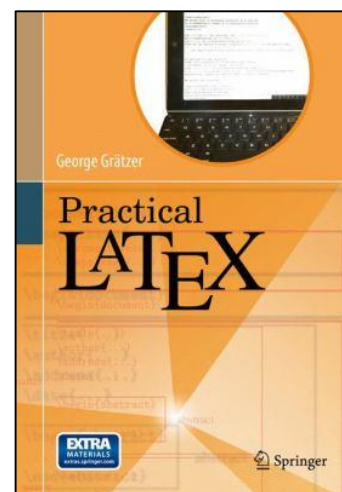
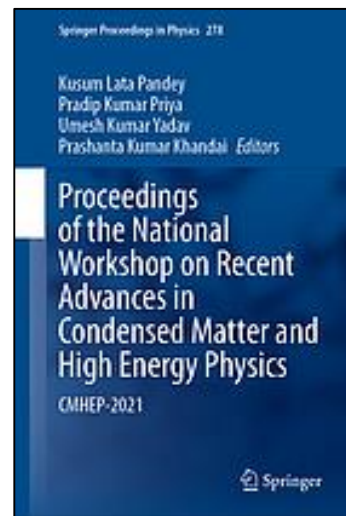
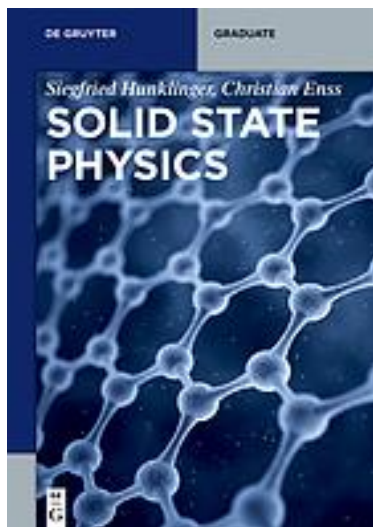
Physics scholarly books or ebooks range from introductory textbooks, handbooks, and subject-specific resources. A select list of [databases](#) that identify books/ebooks are listed below.

Style guides for physics may include: [Featured Resources for Researchers](#) (AIP), [Information for Authors](#) (APS), and [Refining Your Academic Writing: Strategies for Reading, Revising and Rewriting](#).

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Patents

Patents are key scholarly resources. Some databases cover international patents, scholarly content and related information. Key databases provide links to full-text patent documents when appropriate. An extensive [list](#) of patent databases, guides and aids if available for consultation.

A select list of the most highly used open and Brock Library patent database are listed below.



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Bibliographic dataDescriptionClaimsDrawingsOriginal documentCitationsLegal eventsPatent family

Global Dossier

Applicants UNIV KING FAHD PET & MINERALS [SA] +

Inventors HELAL AASIF [SA]; RAHMAN MOHAMMAD MIZANUR [SA]; NAEEM MUHAMMED [SA]; ARAFAT MD EYASIN [SA]; USMAN M

Classifications

IPC C07F15/04; C09K11/06; G01N21/64;

CPC C07F15/045 (EP,US); C09K11/06 (EP,US); G01N21/6428 (US); C09K2211/182 (US); C09K2211/187 (US);

Priorities US202217857545A-2022-07-05

Application US202217857545A-2022-07-05

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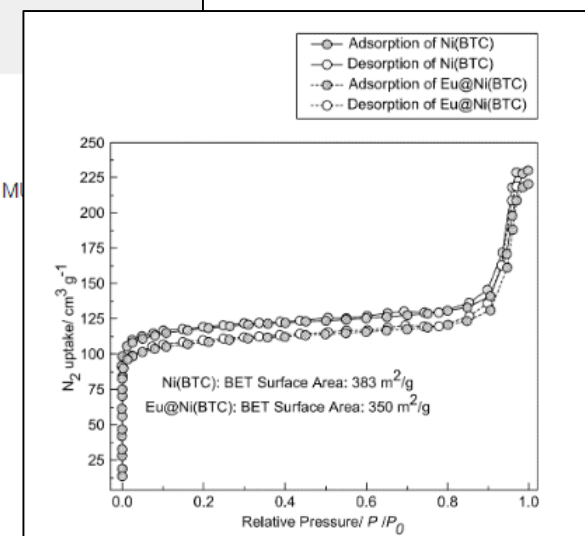
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EUROPIUM DOPED METAL-ORGANIC FRAMEWORK FOR DETECTION OF HETEROAROMATIC COMPOUNDS

Abstract

An europium doped Ni(BTC) Metal Organic Framework (MOF), Eu@Ni(BTC), as a sensor for detecting heteroaromatic compounds. Eu@Ni(BTC) shows selectivity towards ppm for thiophene and pyrrole, respectively. The sensor can be easily regenerated and can be used to analyze thiophene in water.



Aasif, H. (2024). Europium doped metal-organic... (U.S. Patent No. US 2024011906A1). U.S. Patent and Trademark Office. <https://ppubs.uspto.gov/>

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Designation: D6095 – 12 (Reapproved 2023)

Standard Test Method for Longitudinal Measurement of Volume Resistivity for Extruded Crosslinked and Thermoplastic Semiconducting Conductor and Insulation Shielding Materials¹

This standard is issued under the fixed designation D6095; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers the procedure for determining the resistance between two electrodes on a single surface and modifying that value using dimensions of the specimen geometry to calculate a resistivity. However, the geometry of the specimen is such as to support the assumption of a current path primarily throughout the volume of the material between the electrodes, thus justifying the use of the term “longitudinal volume resistivity.” (See 3.1.2.1.)

1.2 In common practice the conductor shield is often referred to as the strand shield.

1.3 Technically, this test method is the measurement of a resistance between two electrodes on a single surface and modifying that value using dimensions of the specimen geometry to calculate a resistivity. However, the geometry of the specimen is such as to support the assumption of a current path primarily throughout the volume of the material between the electrodes, thus justifying the use of the term “longitudinal volume resistivity.” (See 3.1.2.1.)

1.4 Whenever two sets of values are presented, in different units, the values in the first set are the standard, while those in parentheses are for information only.

1.5 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use. For a specific hazard statement, see 7.1.

1.6 This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

¹ This test method is under the jurisdiction of ASTM Committee D09 on Electrical and Electronic Insulating Materials and is the direct responsibility of Subcommittee D09.07 on Electrical Insulating Materials. Current edition approved May 1, 2023. Published May 2023. Originally approved in 1997. Last previous edition approved in 2018 as D6095 – 12 (2018). DOI: 10.1520/D6095-12R23.

2. Referenced Documents

- 2.1 *ASTM Standards*:²
D257 Test Methods for DC Resistance or Conductance of Insulating Materials
D1711 Terminology Relating to Electrical Insulation
D4496 Test Method for D-C Resistance or Conductance of Moderately Conductive Materials

3. Terminology

- 3.1 *Definitions of Terms Specific to This Standard*:
3.1.1 *semiconducting, adj*—moderately conductive, see Terminology D1711 and Test Method D4496.
3.1.2 *longitudinal volume resistivity, n*—an electrical resistance multiplied by a factor calculated from the geometry of a specimen volume between electrodes in contact with one, and only one, surface of the specimen.
3.1.2.1 *Discussion*—In normal wire and cable usage, the longitudinal volume resistivity is simply referred to as “volume resistivity.” This usage is at variance with terminology in Test Methods D257, Terminology D1711, and Test Method D4496.

4. Significance and Use

4.1 The electrical behavior of semiconducting extruded shielding materials is important for a variety of reasons, such as safety, static charges, and current transmission. This test method is useful in predicting the behavior of such semiconducting compounds. Also see Test Method D4496.

5. Apparatus

5.1 See Test Method D4496 for a description of the apparatus, except the electrode system which is described in 7.2.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For Annual Book of ASTM Standards volume information, refer to the standard's Document Summary page on the ASTM website.

D6095 – 12 (2023)

6. Sampling and Test Specimens

6.1 Take one 2-ft (600 mm) sample from each lot, or from lot, whichever is less.

6.2 (250 mm) length of the semi-conducting specimen to test the shield, bisect the conductor. Use only one specimen.

6.3 In accordance with Test Method D4496.

6.4 Crosslinked, condition at 50 °C to eliminate moisture. Then proceed with Test Method D4496.

6.5 All operators as to the safety.

6.6 Testing of four annular (in. (6.5 mm) wide) to distance of at least 2 in. (51 mm) between the two electrodes (the two of shield between the d the potential elec-4496.

6.7 For shield, bisect the conductor. Then, using silver paint apply the silver paint only to the conductor

6.8 at the rated operating temperature equilibrium of the

6.9 a the potential electrode test voltage and a distance of Test Method D257 (73 ± 4 °F) of the insulation shield X1 of Test Method specimen self-heating. test time to 1 min is

6.10 is not required, use a technique that permits accuracy of ± 5 %. Space 1. Make two tests, one

at 23 ± 2 °C (73 ± 4 °F) and one at the rated operating temperature of the insulation material.

8. Calculation

8.1 For each shielding material and each temperature, calculate the volume resistivity by using the following equations:

$$\rho = [2R(D_o^2 - d_o^2)]/L \quad (1)$$

$$\rho = [R(D_o^2 - d_o^2)]/L \quad (2)$$

where:

- ρ = volume resistivity, Ω-cm,
 R = measured resistance, Ω,
 L = distance between potential electrodes, in.,
 D_o = diameter over conductor shielding, in.,
 d_o = diameter over conductor, in.,
 D_o = diameter over insulation shielding, in., and
 d_o = diameter over insulation, in.

Note 1—Even though the diameter of the volume resistivity is in constants and conversion factors, Appendix X1 for a discussion.

9. Report

- 9.1 Report the following:
9.1.1 Sample condition
9.1.2 The volume resistivity material at 23 ± 2 °C,
9.1.3 The volume resistivity material at the temperature,
9.1.4 The volume resistivity material at 23 ± 2 °C,
9.1.5 The volume resistivity material at the temperature,
9.1.6 The electrode system

10. Precision and Bias

- 10.1 *Precision*—This test method, but no statement for activity is planned to develop.
10.2 *Bias*—A statement of a standard reference material

11. Keywords

11.1 conductor shield; conductor shield; insulation shield; semiconducting shield; volume resistivity

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APPENDIX

(Nonmandatory Information)

X1. DERIVATION OF FORMULAS FOR VOLUME RESISTIVITY

X1.1 Insulation Shielding Material X1.1 Fig. X1.1

$$\rho = R(A/L) \quad (X1.1)$$

$$A = [(\pi D^2)/4] - [(\pi d^2)/4] = [\pi(D^2 - d^2)]/4 \quad (X1.2)$$

$$\rho = [R\pi(D^2 - d^2)]/4L \quad (X1.3)$$

where:

- ρ = volume resistivity, Ω-cm,
 R = measured resistance, Ω,
 D = diameter over insulation shielding, in.,
 d = diameter over insulation, in., and
 L = distance between potential electrodes, in.

X1.1.1 In Eq X1.3, substituting the numerical value for π and converting the values in inches to centimetres results in Eq X1.4 which is the same as Eq 1 in 8.1 which gives the volume resistivity in the customary units of Ω-cm.

$$\rho = [2R(D^2 - d^2)]/L \quad (X1.4)$$

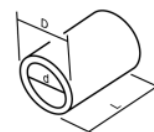


FIG. X1.1 Insulation Shield

X1.2 Conductor Shielding Material X1.2 Fig. X1.2

$$\rho = R(A/L) \quad (X1.5)$$

$$A = \{[(\pi D^2)/4] - [(\pi d^2)/4]\}/2 = \{[\pi D^2 - d^2]\}/8 \quad (X1.6)$$

$$\rho = [R\pi(D^2 - d^2)]/8L \quad (X1.7)$$

where:

- ρ = volume resistivity, Ω-cm,
 R = measured resistance, Ω,
 D = diameter over conductor shielding, in.,
 d = diameter over conductor, in., and
 L = distance between potential electrodes, in.

X1.2.1 In Eq X1.7, substituting the numerical value for π and converting the values in inches to centimetres results in Eq X1.8 which is the same as Eq 2 in 8.1 which gives the volume resistivity in the customary units of Ω-cm.

$$\rho = [R(D^2 - d^2)]/L \quad (X1.8)$$

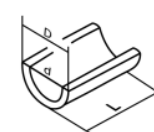


FIG. X1.2 Conductor Shield

ASTM Standard D6095-12, (2023). Standard Test Method for Longitudinal Measurement... ASTM. <https://www.astm.org/>

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High Temperature Method Of Measuring Electrical And Magnetic Properties Of Europium Doped Nickel Oxide
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The measurement of the magnetic moment of materials as a function of temperature In modern AC or DC magnetometers normally has a limited high temperature range up to 400 K. To overcome this problem one needs to design ovens which can handle high temperatures. The highest Curie temperature observed in materials is in pure G



Electronic and Magnetic Properties of MAX Phase (Cr_{1-x}Gdx)₂AlC and Er₃AlC Alloy
Albandri, Huriyyah A; Department of Physics
Bulk samples of (Cr_{1-x}Gdx)₂AlC with X = 0, 0.0025, 0.01, 0.025, 0.05 and Er₃AlC compound were synthesized using the arc melting technique. The samples were characterized by X-ray diffraction, magnetic susceptibility, and four probe resistivity measurements to study their magnetic and electronic properties. Using Rietveld analysis for X-ray



Resistivity of Single Crystal Molybdenum Dioxide
BAUER, KURTIS; Department of Physics
The chemical vapour transport method was used to grow molybdenum oxide single crystals so that their electrical properties could be analyzed. Satisfactory single crystal samples of MoO₂ and Mo₄O₁₁ were grown successfully using I₂ as a transport agent. Crystal growths using TeCl₄ as a transport agent were also performed, though with m



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Seyedeh Parisa Torabi, B.Sc. Physics

Physics(Condensed Matter and Materials Science)

Submitted in partial fulfillment
of the requirements for the degree of

M.Sc. Physics

Faculty of Mathematics and Science, Brock University
St. Catharines, Ontario

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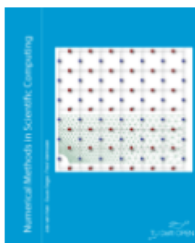
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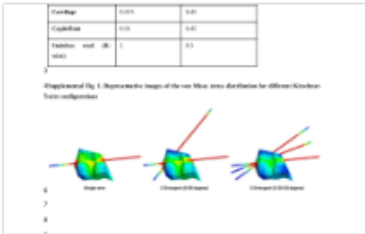
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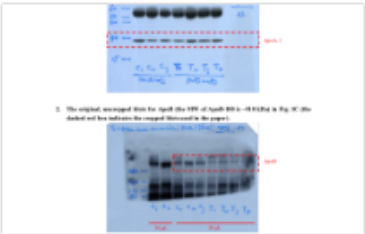
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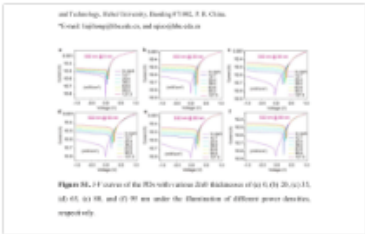
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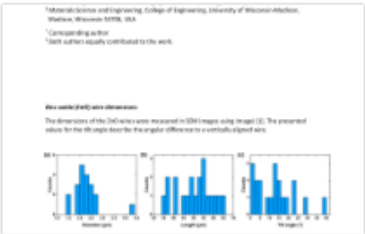
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Mass spectrometry is a crucial technology in numerous applications, but it places stringent requirements on the detector to achieve high resolution across a broad spectrum of ion masses. Low-dimensional nanostructures offer opportunities to tailor properties and achieve performance not reachable in bulk materials. Here, an array of sharp zinc oxide wires was directly grown on a 30 nm thin, free-standing silicon nitride nanomembrane to enhance its field emission (FE). The nanomembrane was subsequently used as a matrix-assisted laser desorption/ionization time-of-flight mass spectrometry detector. When ionized biomolecules impinge on the backside of the surface-modified nanomembrane, the current emitted from the wires on the membrane's front side is amplified by the supplied thermal energy, which allows for the detection of the ions. An extensive simulation framework was developed based on a combination of lateral heat diffusion in the nanomembrane, heat diffusion along the wires, and FE, including Schottky barrier lowering, to investigate the impact of wire length and diameter on the FE. Our theoretical model suggests a significant improvement in the overall FE response of the nanomembrane by growing wires on top. Specifically, long thin wires are ideal to enhance the magnitude of the FE signal and to shorten its duration for the fastest response simultaneously, which could facilitate the future application of detectors in mass spectrometry with properties improved by low-dimensional nanostructures.

HISTORY

- 2024-02-23 - Publication date
- 2024-02-24 - First online date, Posted date

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Haugg, Stefanie; Makumi, Sylvester; Velten, Sven; Zierold, Robert; Aksamija, Zlatan; Blick, Robert H. (2024). Thermally Driven Field Emission from Zinc Oxide Wires on a Nanomembrane Used as a Detector for Time-of-Flight Mass Spectrometry. *ACS Publications*. Journal contribution. <https://doi.org/10.1021/acsomega.3c08932.s001>

X-ray diffraction analysis of ZnO wires

Crystal structure information was obtained by X-ray diffraction (XRD) using a Rigaku SmartLab X-ray diffractometer (Cu K α radiation source). The measurement was performed on a ZnO wire array grown on a silicon nitride (SiN, 100 nm)/Si bulk substrate using the same process conditions as for the SiN nanomembrane (NM). Note that the X-ray beam illuminated the whole ZnO wire area, thus, the measurement is an average over all wires.

The diffraction pattern is displayed in Figure S2. XRD peaks from hexagonal ZnO crystal structure are clearly present as indexed in the figure (reference database: [2]). In comparison to ZnO powder XRD measurements [3], where the (101)-peak is the most intense peak, the strong (002)-peak in Figure S2 indicates a preferred ZnO wire crystal growth along the (002) direction.

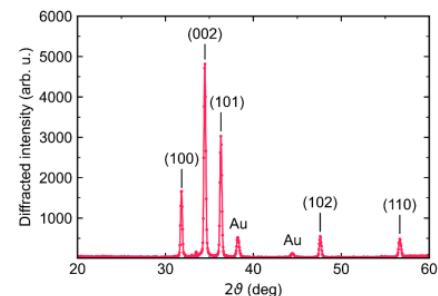


Figure S2. X-ray diffraction measurement on ZnO wires on a silicon bulk substrate. The peak indexing corresponds to the hexagonal ZnO crystal structure [2]. The Au peaks refer to the fcc-Au crystal structure.

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[Submitted on 12 Apr 2023]

High-fidelity dimer excitations using quantum hardware

Norhan M. Eassa, Joe Gibbs, Zoe Holmes, Andrew Sornborger, Lukasz Cincio, Gavin Hester, Paul Kairys, Mario Motta, Jeffrey Cohn, Arnab

Many-body entangled quantum spin systems exhibit emergent phenomena such as topological quantum spin liquids with distinct excitation spectra accessed in the basic quantum unit of emergent many-body spin systems. While canonical Trotterization methods require deep circuits precluding long time-scale simulations, we develop a new class of quantum circuits that can be used to capture longer time dynamics on quantum hardware. The temporal evolution of the 2-spin correlation coefficients enabled the calculation of the excitation spectra in this section. We simulate the triplet gap and the triplet splitting of the quantum dimer with sufficient fidelity to compare to experimental neutron data. Our results on current quantum hardware are in good agreement with INS experiments.

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Physics · 5 March 2008

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Marco Riccardi, Olivier J. F. Martin

2023, Chemical Reviews - Article

Electromagnetic forces and torques enable many key technologies, including optical tweezers or dielectrophoresis. Interestingly, both techniques rely on the same physical process: the interaction of a... more

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1997, Proceedings of the National Academy of Sciences of the United States of America - Article

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Quo vadis, plasmonic optical tweezers?

Light: Science & Applications, 8(1), 35 - April 2019
<https://doi.org/10.1038/s41377-019-0146-x>

Authors

Kenneth B. Crozier - University of Melbourne
Corresponding Author

Abstract

Conventional optical tweezers based on traditional optical microscopes are subject to the diffraction limit, making the precise trapping and manipulation of very small particles challenging. Plasmonic optical tweezers can surpass this constraint, but many potential applications would benefit from further enhanced performance and/or expanded functionalities. In this Perspective, we discuss trends in plasmonic tweezers and describe important opportunities presented by its interdisciplinary combination with other techniques in nanoscience. We furthermore highlight several open questions concerning fundamentals that are likely to be important for many potential applications.

Acknowledgements

This research was sponsored in part by the Australian Research Council (DP150103736, DP180104141, and FT140100577), by the Victorian Endowment for Science, Knowledge and Innovation (VESKI), and by the Laby Foundation. Light: Science & Applications thanks Professor Dayong Jin for handling this article and for his advice on enhancing its presentation.

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Zhe Xu, Wuzhou Song, Kenneth B. Crozier
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¹ K.B. Crozier, "Quo vadis, plasmonic optical tweezers?," *Light Sci Appl* **8**(1), 35 (2019).

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2+1D loop quantum gravity on the edge [↗](#)

[Laurent Freidel](#)¹, [Florian Girelli](#)², [Barak Shoshany](#)³

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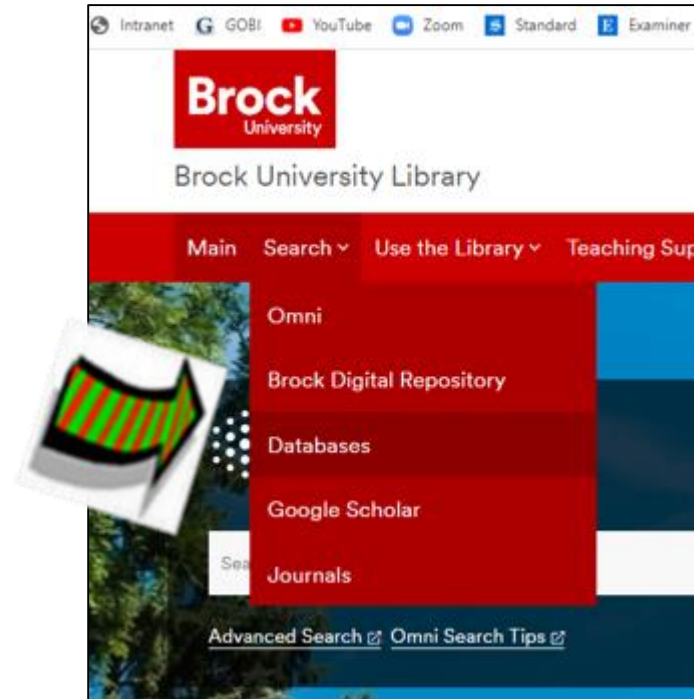
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Physical Review D, 2019 - APS

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We develop a new perspective on the discretization of the phase space structure of gravity in 2+ 1 dimensions as a piecewise-flat geometry in 2 spatial dimensions. Starting from a subdivision of the continuum geometric and phase space structure into elementary cells, we obtain the loop gravity phase space coupled to a collection of effective particles carrying mass and spin, which measure the curvature and torsion of the geometry. We show that the new degrees of freedom associated to the particlelike elements can be

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2 + 1D loop quantum gravity on the edgeLaurent Freidel^{*}*Perimeter Institute for Theoretical Physics, Waterloo, Ontario, Canada*Florian Girelli[†]*Department of Applied Mathematics, University of Waterloo, Waterloo, Ontario, Canada*Barak Shoshany[‡]*Perimeter Institute for Theoretical Physics, Waterloo, Ontario, Canada* (Received 30 November 2018; published 7 February 2019)

We develop a new perspective on the discretization of the phase space structure of gravity in $2 + 1$ dimensions as a piecewise-flat geometry in 2 spatial dimensions. Starting from a subdivision of the continuum geometric and phase space structure into elementary cells, we obtain the loop gravity phase space coupled to a collection of effective particles carrying mass and spin, which measure the curvature and torsion of the geometry. We show that the new degrees of freedom associated to the particlelike elements can be understood as edge modes, which appear in the decomposition of the continuum theory into subsystems and do not cancel out in the gluing of cells along codimension 2 defects. These new particlelike edge modes are gravitationally dressed in an explicit way. This provides a detailed explanation of the relations and differences between the loop gravity phase space and the one deduced from the continuum theory.

DOI: 10.1103/PhysRevD.99.046003

I. INTRODUCTION

One of the key challenges in trying to define a theory of quantum gravity at the quantum level is to find a regularization that does not drastically break the fundamental symmetries of the theory. This is a challenge in any gauge theory, but gravity is especially challenging, for two reasons. First, one expects that the quantum theory possesses a fundamental length scale, and second, the gauge group contains diffeomorphism symmetry, which affects the nature of the space on which the regularization is applied.

In gauge theories such as QCD, the only known way to satisfy these requirements¹ is to put the theory on a lattice, where an effective finite-dimensional gauge symmetry survives at each scale. One would like to devise such a scheme in the gravitational context. In this paper, we develop a step-by-step procedure achieving this in the context of $2 + 1$ gravity. We initially expected to find the so-called holonomy-flux discretized phase space, which appears in loop gravity and produces spin networks after quantization. To our surprise, we discovered that there are additional degrees of freedom (d.o.f.) that behave as a collection of particles coupled to the gravitational d.o.f.

In the loop quantum gravity (LQG) framework, gravity is quantized using the canonical approach, with the gravitational d.o.f. expressed in terms of the connection and frame field. The quantum states of geometry are known as “spin networks.” In this framework, we can show that geometric operators possess a discrete spectrum. This is, however, only possible after one chooses the quantum states to have support on a graph. Spin network states can be understood as describing a quantum version of *discretized* spatial geometry [1], and the Hilbert space associated to a graph can be related, in the classical limit, to a set of discrete piecewise-flat geometries [2,3]. This means that the LQG quantization scheme consists at the same time of a *quantization* and a *discretization*; moreover, the quantization of the geometric spectrum is entangled with the discretization of the fundamental variables. It has been argued that it is essential to disentangle these two different features [4], especially when one wants to address dynamical issues.

In [4,5], it has been argued that one should understand the discretization as a two step process: a *subdivision* followed by a *truncation*. In the first step one subdivides the systems in fundamental cells, and in the second step one chooses a truncation of d.o.f. in each cell which is consistent with the symmetry of the theory. By focusing first on the classical discretization, before any quantization takes place, several aspects of the theory can be clarified. Let us mention some examples:

^{*}lfreidel@perimeterinstitute.ca[†]fgirelli@uwaterloo.ca[‡]bshoshany@perimeterinstitute.ca¹Other than gauge-fixing before regularization.

Freidel, L., Girelli, F., & Shoshany, B. (2019). 2 + 1 D loop quantum gravity on the edge. *Physical Review D*, 99(4), 046003. <https://doi.org/10.1103/PhysRevD.99.046003>

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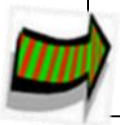
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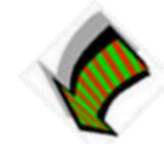
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Title	Creator
2 + 1 D loop quantum gravity on the edge	Freidel et al.

Info Notes Tags Attachments Related

Item Type Journal Article

Title 2 + 1 D loop quantum gravity on the edge

Author Freidel, Laurent

Author Girelli, Florian

Author Shoshany, Barak

Publication Physical Review D

Volume 99

Issue 4

Pages 046003

Date 2019-2-7

Series

Series Title

Series Text

Journal Abbr Phys. Rev. D

Language en

DOI [10.1103/PhysRevD.99.046003](#)

ISSN 2470-0010, 2470-0029

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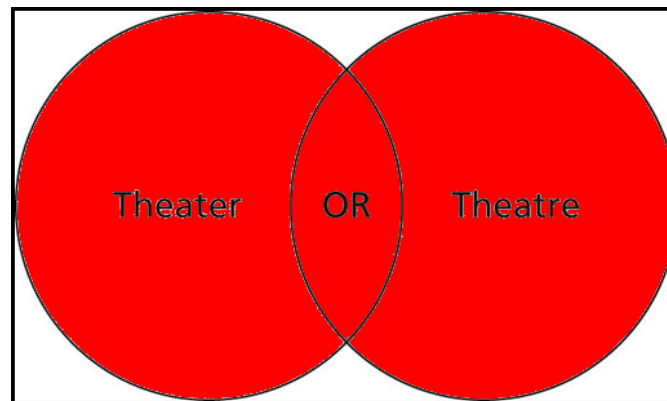
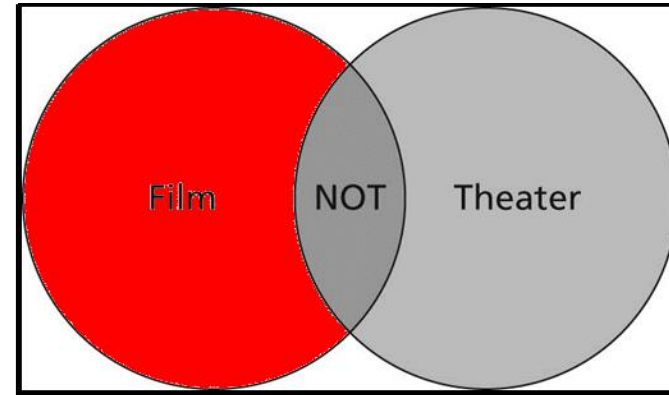
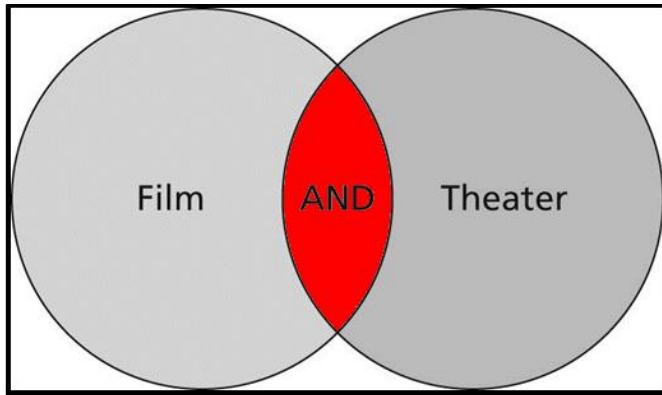
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An infrared study of antiferromagnetic medium and high entropy rocksalt structure oxides

Journal of Applied Physics, Page 184103 (8 pp.), 2021

Afsharvosoughi, T.^[1]; Crandles, D.A.^[1] ✉

Author affiliation:
[1] Brock University, Department of Physics, St. Catharines, ON L2S 3A1, Canada

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Abstract

The infrared reflectance of a set of antiferromagnetic entropy-stabilized rocksalt structure oxides is measured in order to study the effect of a random array of cations, spin-phonon coupling, and anharmonicity on phonon mode behavior. Samples prepared by conventional solid state reaction from quaternary or quinary equimolar mixtures of CoO, ZnO, CuO, NiO, and MgO. They were characterized by magnetometry, x-ray diffraction, and reflectance spectroscopy. It is found that the Néel temperature (T_N) depends on the concentration of magnetic ions. The far-infrared reflectance spectra consist of one strong reststrahlen band. The main transition is associated with the spin-phonon interaction of a cation associated with the spin-phonon interaction.

Indexing

Controlled terms:

anharmonic lattice modes

antiferromagnetic materials

cobalt compounds

copper compounds

crystal growth from solid

entropy

II-VI semiconductors

infrared spectra

magnesium compounds

magnetometry

Neel temperature

nickel compounds

reflectivity

semiconductor growth

spin-phonon interactions

wide band gap semiconductors

X-ray diffraction

zinc compounds

Classification codes:

- A7830G Infrared and Raman spectra in inorganic solids
- A6320R Anharmonic lattice modes
- A6550 Thermodynamic properties of solids
- A7530K Magnetic phase behavior
- A7550E Antiferromagnetism
- A8110J Growth from solid phase
- B0510 Crystal growth
- B2520D II-VI and III-V semiconductors
- B2520E Oxide and ferrite semiconductors

Patent Information

IPC Codes: H01F1/00 - C30B1/00

Chemical indexing:

CoO/bin Co/bin O/bin; ZnO/bin Zn/bin O/bin; CuO/bin Cu/bin O/bin; NiO/bin Ni/bin O/bin

Discipline:

Physics (A); Electrical/Electronic engineering (B)

Treatment:

Experimental (EXP)

Material Identity Number: DK28-2022-053

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Vocabulary search



for

deep learning

Search index 🔍

Database:



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deep learning > deep learning (artificial intelligence)

☒ deep learning (artificial intelligence)

For: deep convolutional neural networks; deep neural networks; transformers (machine learning)

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☐ learning (artificial intelligence)

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☐ cybernetics

☐ neural nets

Broader terms

☐ learning (artificial intelligence)

☐ neural nets

Related terms

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☐ convolutional neural nets

☐ data augmentation

☐ feature extraction

☐ graph neural networks

☐ image classification

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Liu, C. (Nanjing University of Aeronautics and Astronautics, College of Mechanical and Electrical Engineering, China); **Tang, D.; Zhu, H.; Nie, Q.; Chen, W.; Zhao, Z.** **Source:** Robotics and Computer-Integrated Manufacturing, p 102638, 2024
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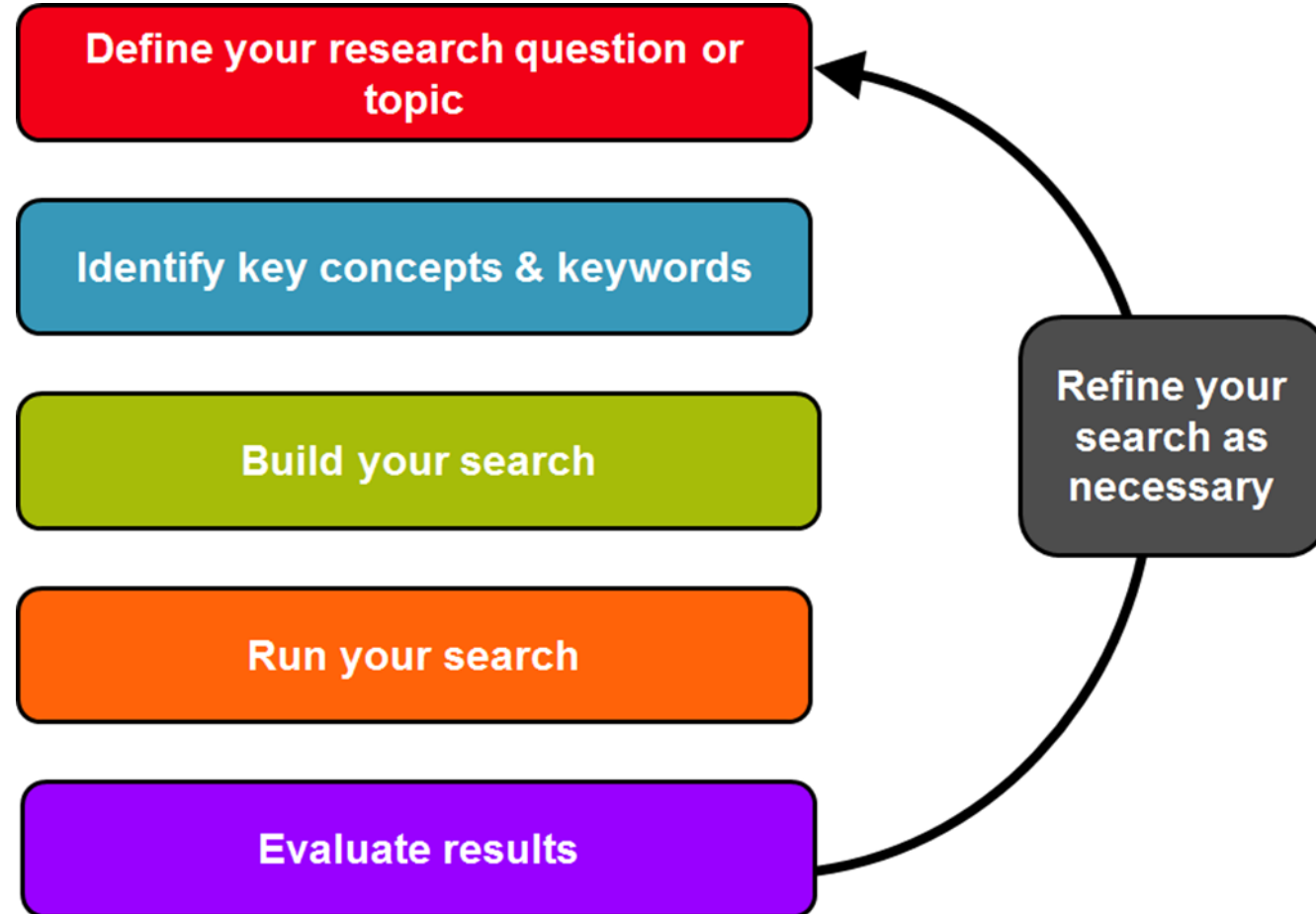
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> 📄 Construction of college network public physical education teaching resource platform system based on deep learning	Li
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▼ Author	Li, W.		− ⊕
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Volume			
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Pages	6825-35		
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	Even though it has been shown that retrieval practice could foster deeper learning and better long-term retention in other domains such as psychology, it is rarely studied in the context of physics learning where students need to solve more complicated problems. To an even lesser degree is comparing retrieval-based learning with other active learning style methods adopted in the physics classro ... Show more	41
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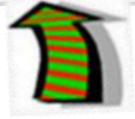
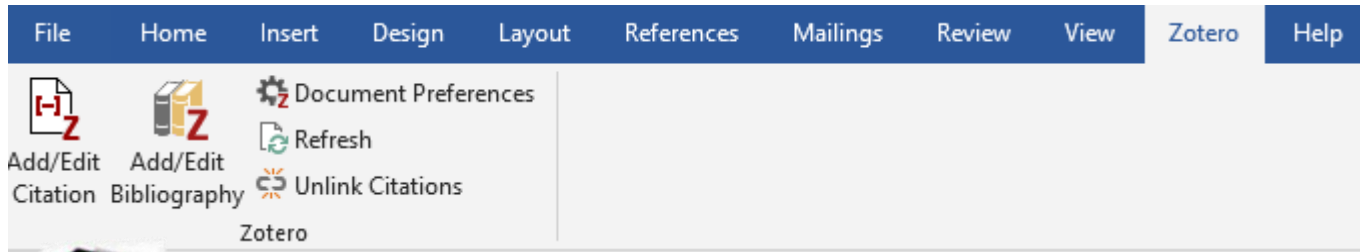
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Loop quantum gravity is the next big thing (Freidel, Girelli & Shoshany, 2019)...



References

Freidel, L., Girelli, F., & Shoshany, B. (2019). 2 + 1 D loop quantum gravity on the edge. *Physical Review D*, 99(4), 046003. <https://doi.org/10.1103/PhysRevD.99.046003>



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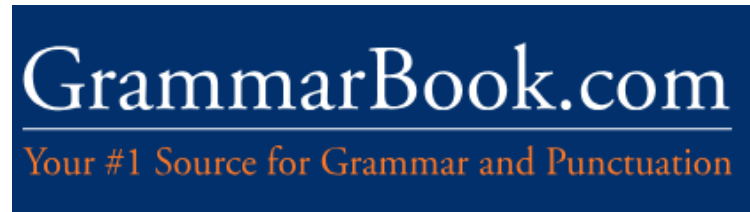
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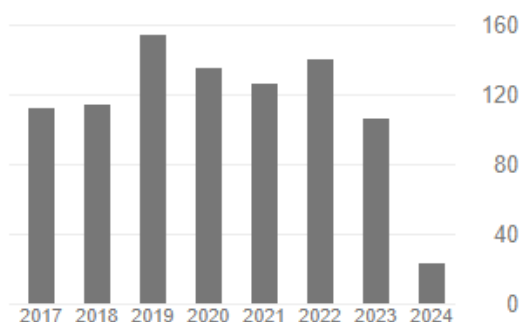
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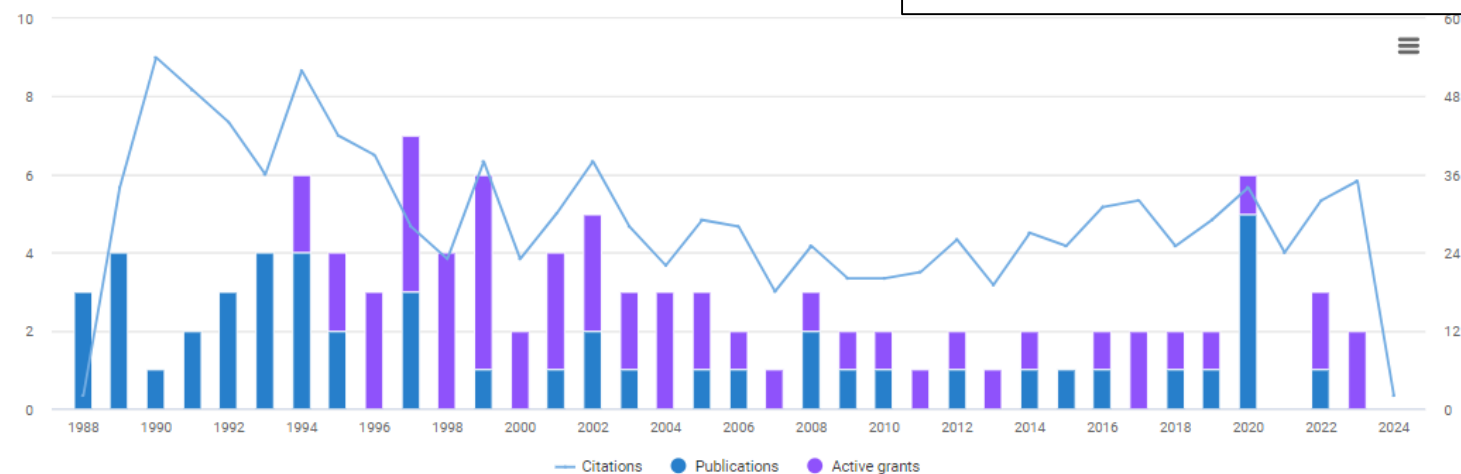
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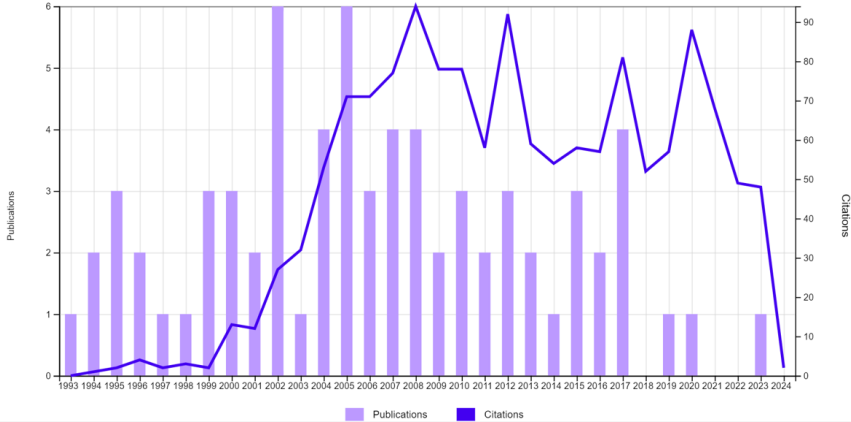
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Poster presented at the International Cool Climate Symposium held at Brock University, St. Catharines, Ontario, Canada, July 17-21, 2022. Poster created and presented by Ian D. Gordon, Brock University, Betty Balbraith, Washington State University, and Chris Savino, Cornell University.

Addeddate [2022-07-12 19:22:05](#)

Identifier [gordon-galbraith-savino-defining-cool-climate-research-a-bibliographic-analysis-](#)

Identifier-ark [ark:/13960/s299rpb7d7j](#)

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Ocr_parameters [-l eng](#)

Ppi [300](#)

Scanner [Internet Archive HTML5 Uploader 1.6.4](#)

Do you have a data management plan?

Research Data Management

Planning, managing, and maintaining data that is collected or created through research is a critical part of the research process. The Library provides expertise, support and access to resources that enable researchers to manage their research data in effective and efficient ways.

Brock University Research Data Management Strategy

The Government of Canada's Tri-Agency Research Data Management Policy requires Brock University, as an institution that administers CIHR, NSERC, or SSHRC funds, to develop and publish an RDM Strategy on the Brock University website by March 1, 2023. Brock University followed a [consultative and inclusive process](#) to develop this Strategy.

[GO TO BROCK UNIVERSITY STRATEGY](#) ➤

Tri-Agency Research Data Management Policy

The agencies believe that research data collected through the use of public funds should be responsibly and securely managed and be, where ethical, legal and commercial obligations allow, available for reuse by others. To this end, the agencies support the FAIR (Findable, Accessible, Interoperable, and Reusable) guiding principles for research data management and stewardship. ~Government of Canada

[GO TO TRI-AGENCY POLICY](#) ➤

Library Support

Planning, managing, and maintaining data that is collected or created through research is a critical part of the research process. This guide provides an introduction to the key questions you need to answer about your data, links to other resources for more information, and details about data hosting options.

[GO TO LIBRARY GUIDE](#) ➤

How do you anticipate visualizing your data?

<https://brocku.ca/library/dsl/>

Digital Scholarship Lab

We Can Help You With:

Managing Your Research Data

Developing Your Digital Project

Finding And Using Data

Visualizing Your Data

Mapping Your Data (GIS)

Processing Your Data (HPC)



The Digital Scholarship Lab brings together a variety of services and expertise that support digital research initiatives happening across Brock University.

Have you created any database citation alerts to remain current?

Citation alerts

Journal alerts

Search alerts

Author alerts

Recommendations alert

Search Alerts will email you when new publications are added to the database that match your saved search criteria. For example, if your saved search is on Nanotechnology, our system emails new works on this topic at a frequency of your choice.

[How do Citation Topics affect my Saved searches?](#)

Alert name - ascending ▾ < 1 of 1 >

Name * cool climate	TS=(Regulated Deficit Irrigation Alters Anthocyanins, Tannins and Sensory Properties of Cabernet Sauvignon Grapes and Wines) Database : All Databases	Active ▾	Rerun Search	More options ▾
Name * information seeking	TS=("Information Seeking") Database : Web of Science Core Collection	Inactive ▾		
Name * Math alert	10.1080/0194262X.2020.1758284 (DOI) and Preprint Citation Index (Exclude – Database) Database : All Databases	Active ▾	Rerun Search	More options ▾
Name * Physics	10.1080/0194262X.2021.1991546 (DOI) and Preprint Citation Index (Exclude – Database) Database : All Databases	Active ▾	Rerun Search	More options ▾
Name * Ward periodontal paper c	"periodontal disease*" (Topic) and surgery or surgical or operat* (Topic) and pain* or headache* or "head ache*" or medicat* (Topic) Database : All Databases	Active ▾	Rerun Search	More options ▾

Register, create an account, click on “Create Alert”, different types of alerts available...

Have you discussed how best to mobilize your knowledge to promote your research?

Knowledge mobilization

The Institute has recognized that Knowledge Mobilization (KMb) is an important part of the research process. KMb refers to the movement of research into active use with knowledge users in order to help facilitate the uptake of research findings, partnerships and impacts around practice, policy and behaviour change.

KMb focuses on “getting the right information to the right people in the right format at the right time so as to influence decision-making” (Ontario Neurotrauma Foundation, 2005). At the Institute we focus on collaborative and integrative KMb, working with our local, provincial, national and international partners, from a variety of sectors, to co-create research that has true application outside of the university. There are various terms that can be used to describe KMb, including Knowledge Translation, Knowledge Brokering and Knowledge Exchange.

The Lifespan Institute’s KMb work includes the following initiatives:

- Capacity building
 - The Lifespan Institute coordinates and runs a 7-week KMb workshop for Lifespan Institute members and their students. This workshop is free of charge for members and provides a high-level introduction to KMb and the associated concepts/practices, while also working in tangible exercises for participants to practice KMb. This workshops runs once per term from the fall to spring semesters at Brock. Any Lifespan Institute members or students interested in learning more can connect with Jayne Morrish at jmorrish@brocku.ca

RESEARCH IMPACT UNIT (ORS)

Jayne Morrish

Knowledge Mobilization Officer

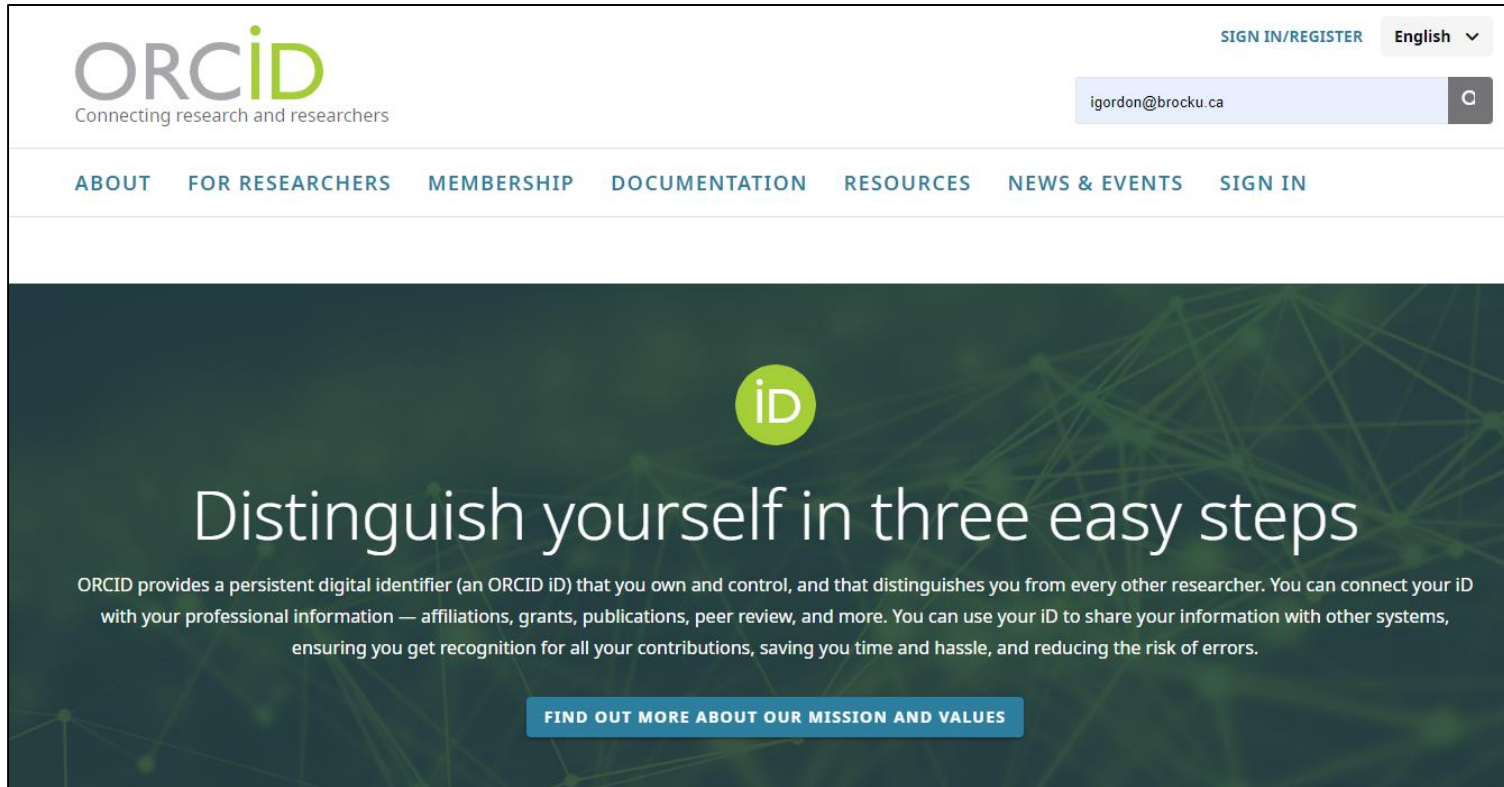
905 688 5550 x4566

jmorrish@brocku.ca

Do you have an ORCID ID?

<https://orcid.org/>

ORCID



The screenshot shows the ORCID website homepage. At the top left is the ORCID logo with the tagline "Connecting research and researchers". To the right is a "SIGN IN/REGISTER" link and a language dropdown set to "English". Below this is a search bar containing the email "igordon@brocku.ca" and a search icon. A navigation menu includes links for "ABOUT", "FOR RESEARCHERS", "MEMBERSHIP", "DOCUMENTATION", "RESOURCES", "NEWS & EVENTS", and "SIGN IN". The main content area features a large green circular icon with "iD" inside, followed by the heading "Distinguish yourself in three easy steps". Below this is a paragraph explaining that ORCID provides a persistent digital identifier (an ORCID iD) that researchers own and control, which can be connected to professional information like affiliations and grants. At the bottom is a blue button that says "FIND OUT MORE ABOUT OUR MISSION AND VALUES".

ORCID
Connecting research and researchers

SIGN IN/REGISTER English ▾

igordon@brocku.ca

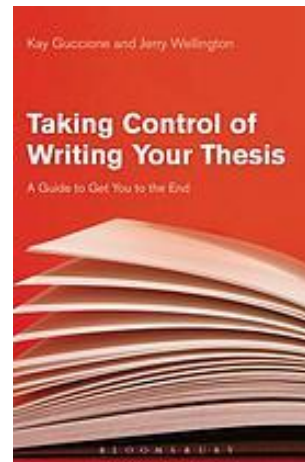
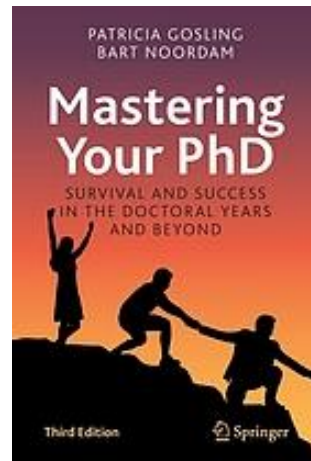
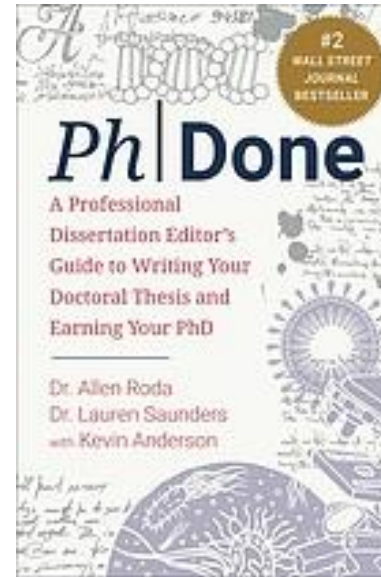
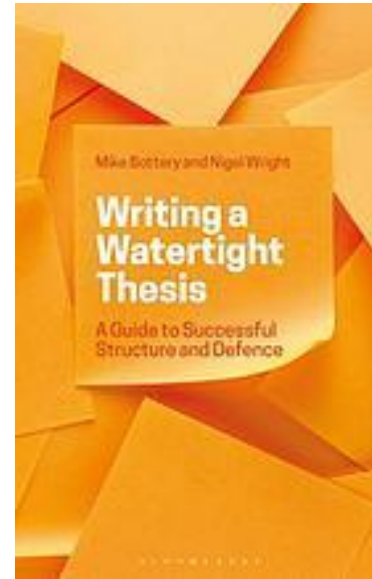
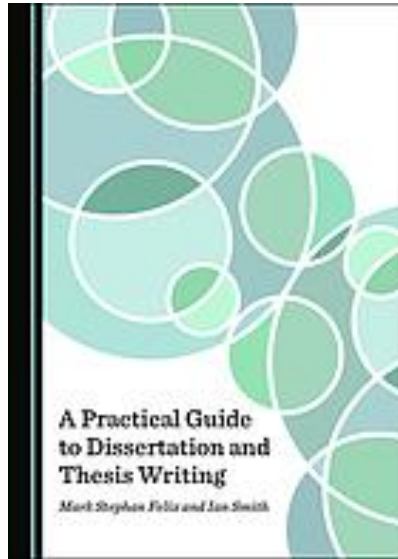
ABOUT FOR RESEARCHERS MEMBERSHIP DOCUMENTATION RESOURCES NEWS & EVENTS SIGN IN

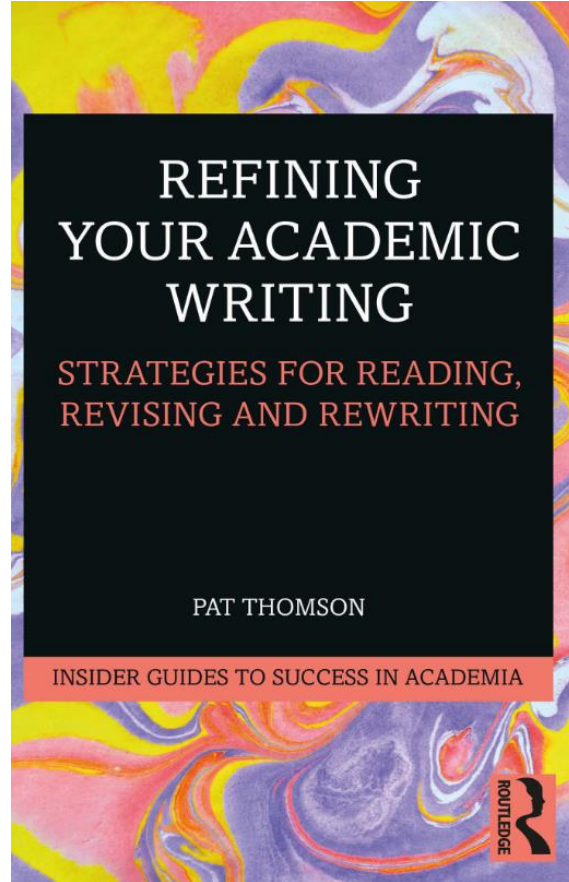
iD

Distinguish yourself in three easy steps

ORCID provides a persistent digital identifier (an ORCID iD) that you own and control, and that distinguishes you from every other researcher. You can connect your iD with your professional information — affiliations, grants, publications, peer review, and more. You can use your iD to share your information with other systems, ensuring you get recognition for all your contributions, saving you time and hassle, and reducing the risk of errors.

FIND OUT MORE ABOUT OUR MISSION AND VALUES







36. Authorship: when to use a personal pronoun, 'I/we'

Writing is, at its very core, a form of self-expression,¹¹ an expression of your thinking. Yet teachers of composition

(3) Concluding well

Conclusions leave the reader with a strong impression. The conclusion generally requires bigging up what you've done. You have to name and claim your original contributions. You have to tell readers what they now know, thanks to your paper. Even if you don't feel like it, you

have to write the conclusion. You have to have learnt. The reader has to have learnt. The reader has to have learnt the topic, as John Warner

The conclusion is the place to be a bit assertive, to show everything, but you can't be timid and say you didn't do that yet. It is unimportant. If you are concluding with sufficient mon up a last bit of

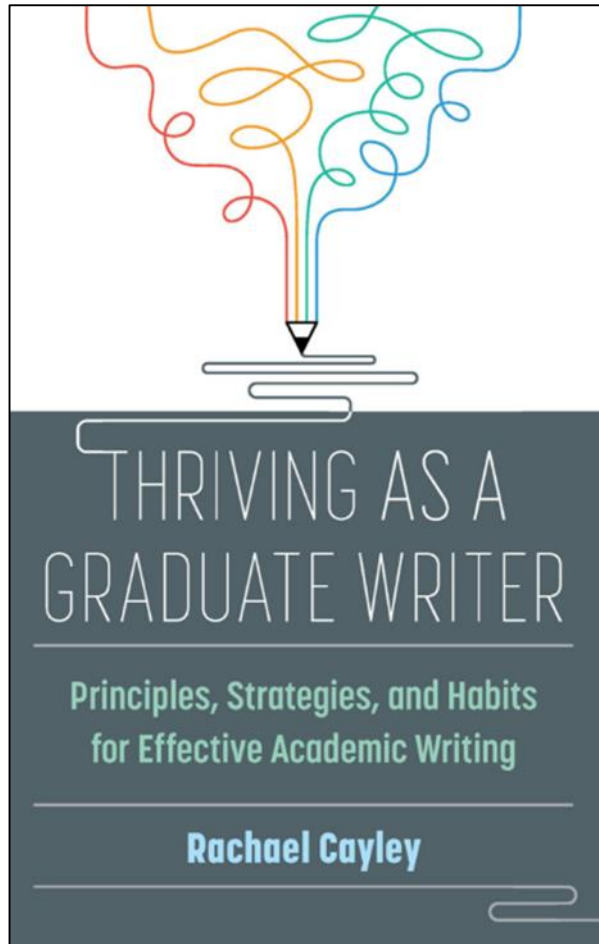
(3) Quotomania

I am not sure who invented the term, but it describes the excessive use of quotations. While many writers often suffer from quotomania, experts on quotations. Expert scholars steal points from others' work. They use quotations when there is no better way of explaining something. When they want to give a flavour of a particularly scholarly 'voice' in addition to their own. Overquoting puts the reader off. An encounter with slabs of over-documented, excessively exemplified prose is generally monotonous, dull and hard to read (see Figure 9.5). Unkind readers may assume that the writer has no ideas of their own, and that they are incapable of anything but derivative thought.

(2) Vary sentence length

Academic sentences are often lengthy. The writer makes a point and then adds multiple caveats and embellishments. An academic sentence can go up to 60, even 70 words without flinching.

Academic writers can reasonably expect academic colleagues to stay upright at the occasional lengthy stretch of syntax. They won't rub their eyes and nod off at their desks, even though they might sigh a bit. But too many words and thoughts in a sentence leave the average scholarly reader confused. They can't remember the main point they are meant to be following. The reader-asleep-or-confused problem is exacerbated by nothing *but* long sentences: 70 words followed by another 70 words, followed by . . . halfway through and it's time for a cup of tea.



Writing in Graduate School: Why It Feels So Hard

“I feel like I should already know how to write.”

“I feel like my writing difficulties mean I don’t belong here.”

“I feel like I’m alone in my writing struggles.”

“I feel like academic writing can’t be done well.”

https://service.elsevier.com/app/contact/supporthub/engineering-village/

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How to contact us on Engineering Village

Last updated on January 03, 2024

To help answer you faster, we may ask you to provide the following:

- Screenshots and the specific address of the website you have questions about
- Reference number (e.g. 230101-123456) available when you contact us. You can find our reference in the subject field of our email replies.

USA, Canada and Latin America

Location	Contact number	Opening times
North America	+1 888 615 4500 (Toll Free)	Sunday 6:00 p.m. to Friday 10:00 p.m. (Central Standard Time)
South America	+1 314 447 8070	Sunday 6:00 p.m. to Friday 10:00 p.m. (Brasilia Standard Time)

<https://support.clarivate.com/>



-  Chat with an expert
-  Product or technical question
-  Data Changes
-  Request SSO (Shibboleth) access for your institution
-  Email our support team
-  Learning & Training
-  My cases

Where can I get help with seeking information?

Data visualization, Daniel Brett, Digital Scholarship Lab

<https://brocku.ca/library/dsl/> email dsl@brocku.ca

Research Data Management, Nicole Stradiotto

<https://brocku.ca/library/dsl/> email nstradiotto@brocku.ca

Research Lifecycle, Denise Smith

<https://brocku.ca/library/publishing-support/> email dsmith@brocku.ca

Where can I get help with seeking information?

Brock Library Research Guides

<https://brocku.ca/library/>

Email the Library

libhelp@brocku.ca

Ask Us Chat service

<https://brocku.ca/library/chat/>



Book a Consultation

<https://calendar.library.brocku.ca/appointments/researchconsultation>

Ask Us Chat 

<https://brocku.ca/library/research-support/>



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Brock University > Brock University Library > Research Support

IN THIS SECTION

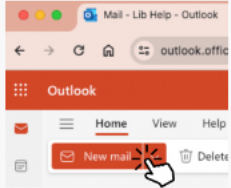
- GET HELP
- WATCH A VIDEO TUTORIAL
- USE A RESEARCH GUIDE
- FIND CITATION HELP
- SYSTEMATIC REVIEWS & EVIDENCE SYNTHESSES
- MAKERSPACE SUPPORT
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- DATA, GIS & MAP SUPPORT

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Research Support

Get help with your research questions



ca

here and we'll make sure it gets a response within 48hrs.

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Stop by the Desk! Our friendly staff can help you

LIBRARY HOURS



Book a Research Consultation

Meet with a Librarian for in-depth support with your research.

BOOK AN APPOINTMENT

FIND A LIBRARIAN

Make an Appointment Research Consultation

Your Librarian can help you:

- use the best search tools for your assignments
- find information sources on your specific topic
- develop effective research strategies
- become a confident and independent researcher

1. Select One

▼ Librarian

Research Consultation (30 minutes) ▼

☐ Justine Cotton



☒ Ian Gordon (he/him)



☐ Jennifer Thiessen



☐ Elizabeth Yates



☐ Kimberly Ash



☐ Denise Smith



☐ Vanja Stojanovic



2. Select Date:

🕒

Mar ▼

2024

🕒

Su	Mo	Tu	We	Th	Fr	Sa
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

3. Select Time:

Tuesday, March 12, 2024

Time Zone: Eastern Time - US & Canada ([change](#))

1:00pm

1:30pm

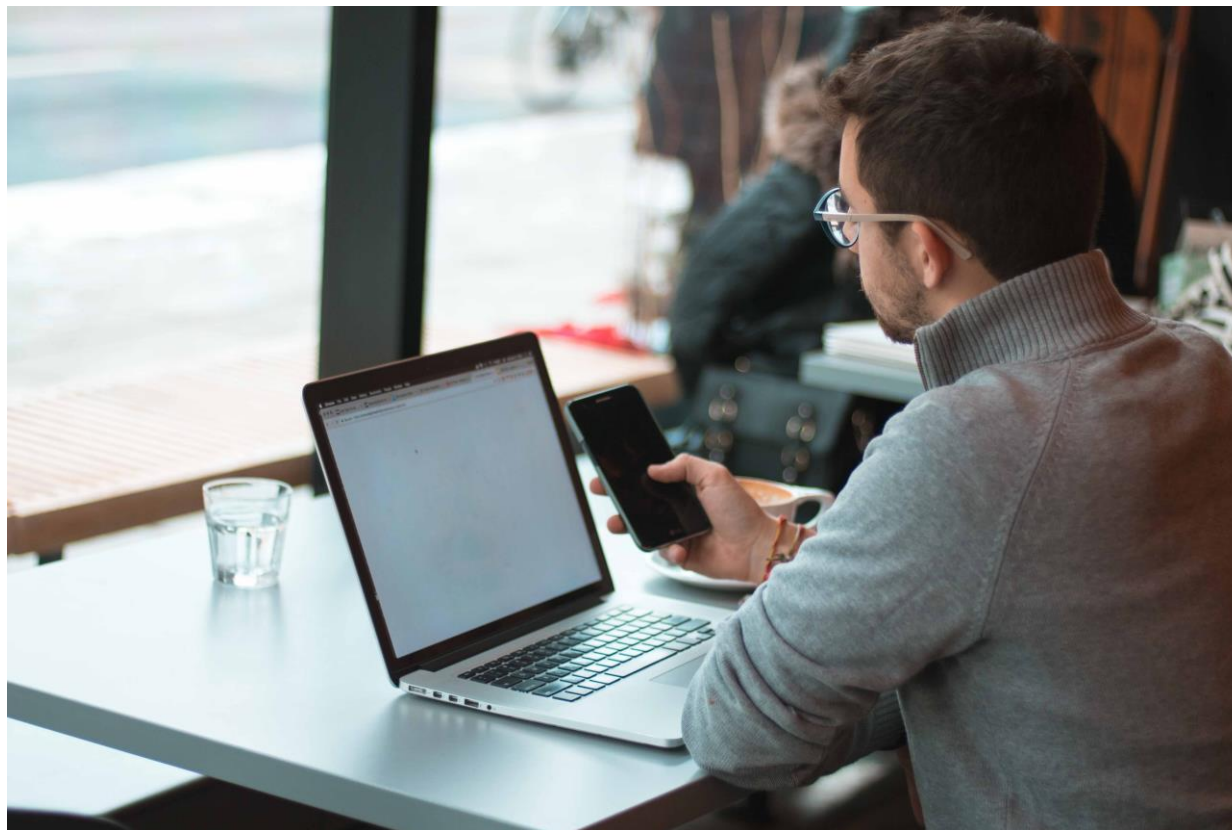
2:00pm

2:30pm

3:00pm

3:30pm

Continue



Man sitting near table with laptop photo
by [Joseph Frank](#) on [Unsplash](#)

An information-literate individual is able to 'evaluate information and its sources critically, incorporate selected information into one's knowledge base, and use information effectively to accomplish a specific purpose'.

<https://www.ala.org/acrl/standards/ilframework>



Ian Gordon

Teaching & Learning Librarian
igordon@brocku.ca